

## CLAIMS

Having described our invention, we claim:

1. A device for converting hydrocarbon-containing solid material into a resultant hydrogen-containing gas, comprising:
  - a. a gas supply, supplying hydrocarbon-containing gas;
  - b. a solid supply, supplying hydrocarbon-containing solid;
  - c. a solid injector, capable of dispersing said hydrocarbon-containing solid into said hydrocarbon-containing gas, in order to form a hydrocarbon mixture;
  - d. an acceleration/gasification tube, including
    - i. a first expansion nozzle for expanding and accelerating said hydrocarbon mixture, wherein said first expansion nozzle has an intake side and a discharge side, and wherein said intake side is connected to said solid injector so as to receive said hydrocarbon mixture from said solid injector;
    - ii. an acceleration tube, having a first end and a second end, wherein said first end is connected to said discharge side of said first expansion nozzle;
    - iii. a heat source heating said acceleration tube, and thereby heating said hydrocarbon mixture within said acceleration tube to convert a portion of said hydrocarbon mixture to said resultant hydrogen-containing gas;
  - e. a diffuser, including a second expansion nozzle connected to said second end of said acceleration tube for receiving said resultant hydrogen-containing gas; and

- f. gas evacuating means connected to said diffuser, capable of rapidly evacuating said resultant hydrogen-containing gas from said diffuser in order to maintain a constant flow through said acceleration/gasification tube and said diffuser.
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- 2. A device as recited in claim 1, wherein said diffuser includes a gas cooling jacket, circulating a cooling gas in order to cool said resultant hydrogen-containing gas traveling within said diffuser.
  - 3. A device as recited in claim 1, wherein said diffuser includes a liquid cooling jacket, circulating a cooling liquid in order to cool said resultant hydrogen-containing gas traveling within said diffuser.
  - 4. A device as recited in claim 1, wherein said heat source comprises at least one electric heating element.
  - 5. A device as recited in claim 1, wherein said heat source comprises at least one gas burner.
  - 6. A device as recited in claim 1, further comprising a filter connected between said diffuser and said gas evacuating means.
  - 7. A device as recited in claim 1, wherein said gas evacuating means is a pump.

8. A device for converting hydrocarbon-containing liquid material into a resultant hydrogen-containing gas, comprising:
- a. a gas supply, supplying hydrocarbon-containing gas;
  - b. a liquid supply, supplying hydrocarbon-containing liquid;
  - c. a liquid injector, capable of dispersing said hydrocarbon-containing liquid into said hydrocarbon-containing gas, in order to form a hydrocarbon mixture;
  - d. an acceleration/gasification tube, including
    - i. a first expansion nozzle for expanding and accelerating said hydrocarbon mixture, wherein said first expansion nozzle has an intake side and a discharge side, and wherein said intake side is connected to said solid injector so as to receive said hydrocarbon mixture from said solid injector;
    - ii. an acceleration tube, having a first end and a second end, wherein said first end is connected to said discharge side of said first expansion nozzle;
    - iii. a heat source heating said acceleration tube, and thereby heating said hydrocarbon mixture within said acceleration tube to convert a portion of said hydrocarbon mixture to a resultant hydrogen-containing gas;
  - e. a diffuser, including a second expansion nozzle connected to said second end of said acceleration tube for receiving said resultant hydrogen-containing gas; and
  - f. gas evacuating means connected to said diffuser, capable of rapidly evacuating said resultant hydrogen-containing gas in order to maintain a constant flow through said acceleration/gasification tube and said diffuser.

9. A device as recited in claim 8, wherein said diffuser includes a gas cooling jacket, circulating a cooling gas in order to cool said resultant hydrogen-containing gas traveling within said diffuser.
10. A device as recited in claim 8, wherein said diffuser includes a liquid cooling jacket, circulating a cooling liquid in order to cool said resultant hydrogen-containing gas traveling within said diffuser.
11. A device as recited in claim 8, wherein said heat source comprises at least one electric heating element.
12. A device as recited in claim 8, wherein said heat source comprises at least one gas burner.
13. A device as recited in claim 8, further comprising a filter connected between said diffuser and said gas evacuating means.
14. A device as recited in claim 8, wherein said gas evacuating means is a pump.

15. A device for converting hydrocarbon-containing slurry material into a resultant hydrogen-containing gas, comprising:
- a. a gas supply, supplying hydrocarbon-containing gas;
  - b. a slurry supply, supplying hydrocarbon-containing slurry;
  - c. a slurry injector, capable of dispersing said hydrocarbon-containing slurry into said hydrocarbon-containing gas, in order to form a hydrocarbon mixture;
  - d. an acceleration/gasification tube, including
    - i. a first expansion nozzle for expanding and accelerating said hydrocarbon mixture, wherein said first expansion nozzle has an intake side and a discharge side, and wherein said intake side is connected to said solid injector so as to receive said hydrocarbon mixture from said solid injector;
    - ii. an acceleration tube, having a first end and a second end, wherein said first end is connected to said discharge side of said first expansion nozzle;
    - iii. a heat source heating said acceleration tube, and thereby heating said hydrocarbon mixture within said acceleration tube to convert a portion of said hydrocarbon mixture to a resultant hydrogen-containing gas;
  - e. a diffuser, including a second expansion nozzle connected to said second end of said acceleration tube for receiving said resultant hydrogen-containing gas; and
  - f. gas evacuating means connected to said diffuser, capable of rapidly evacuating said resultant hydrogen-containing gas in order to maintain a constant flow through said acceleration/gasification tube and said diffuser.

16. A device as recited in claim 15, wherein said diffuser includes a gas cooling jacket, circulating a cooling gas in order to cool said resultant hydrogen-containing gas traveling within said diffuser.
17. A device as recited in claim 15, wherein said diffuser includes a liquid cooling jacket, circulating a cooling liquid in order to cool said resultant hydrogen-containing gas traveling within said diffuser.
18. A device as recited in claim 15, wherein said heat source comprises at least one electric heating element.
19. A device as recited in claim 15, wherein said heat source comprises at least one gas burner.
20. A device as recited in claim 15, further comprising a filter connected between said diffuser and said gas evacuating means.
21. A device as recited in claim 15, wherein said gas evacuating means is a pump.